

Bacteria TMDLs for Kimberling Creek, Nobusiness Creek, East Wilderness Creek, Town Creek, and Walker Creek

First Public Meeting
July 28, 2015



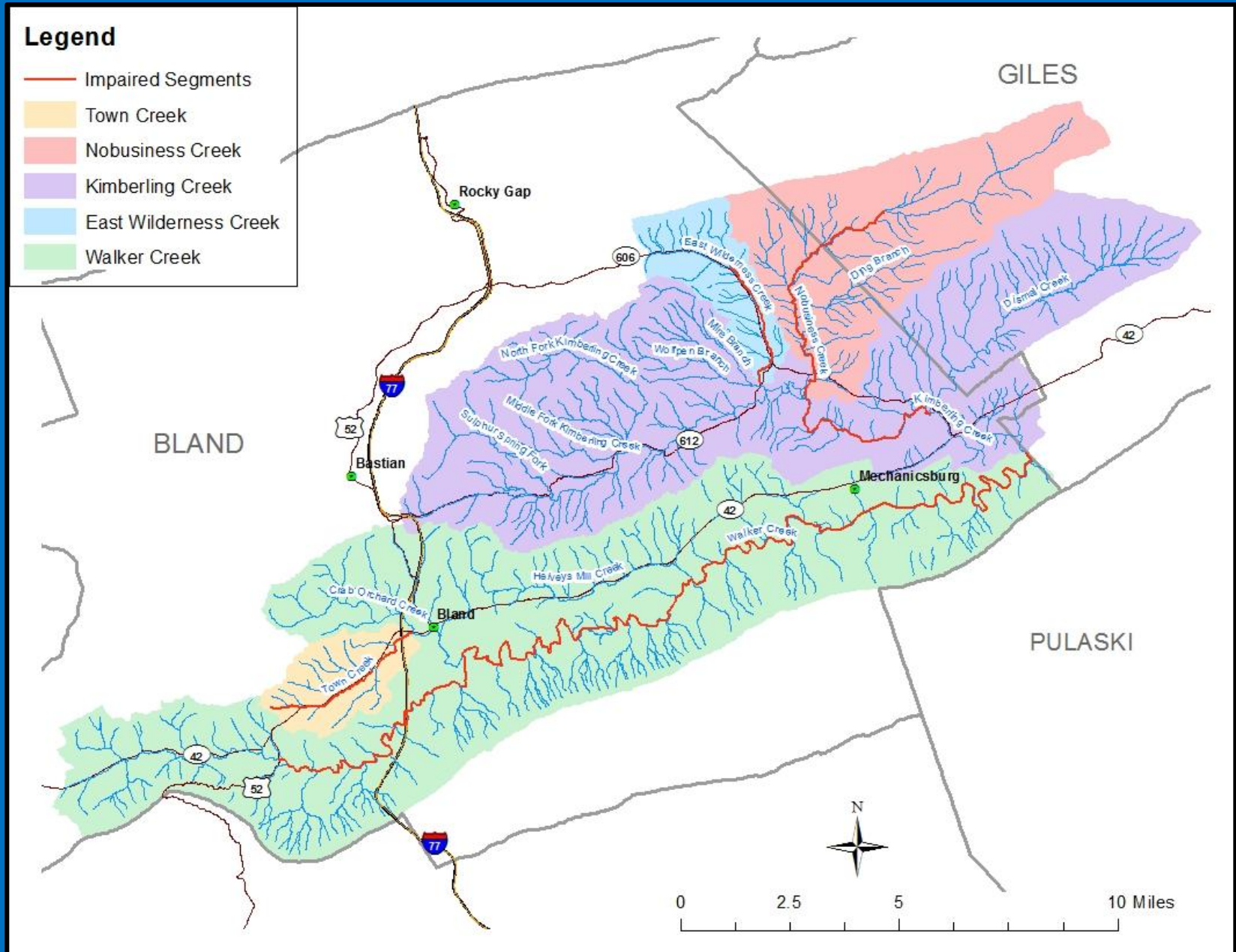
Overview of Presentation

- Overview of TMDL Development
- Watersheds Characterization
- Potential Bacteria Sources
- Next Steps

TMDL Development

- **Watershed and Source Characterization** – estimate bacteria loads in the watershed through GIS calculations, personal contacts, and professional opinions
- **Modeling** – determine the contribution of each load to the stream
- **Allocation** – determine how much bacteria from various sources can enter the stream without causing water quality violations

Location of Impaired Segments



Legend

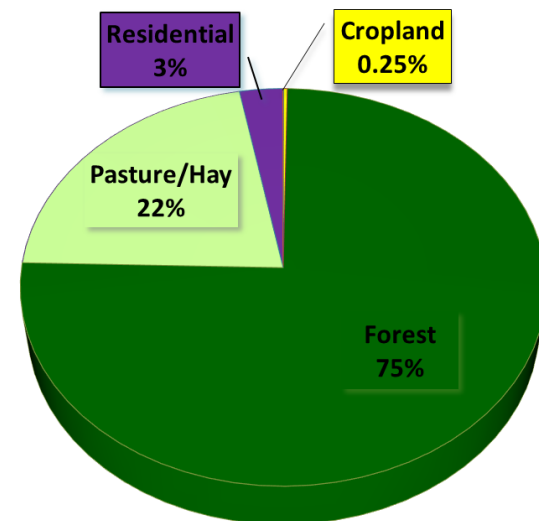
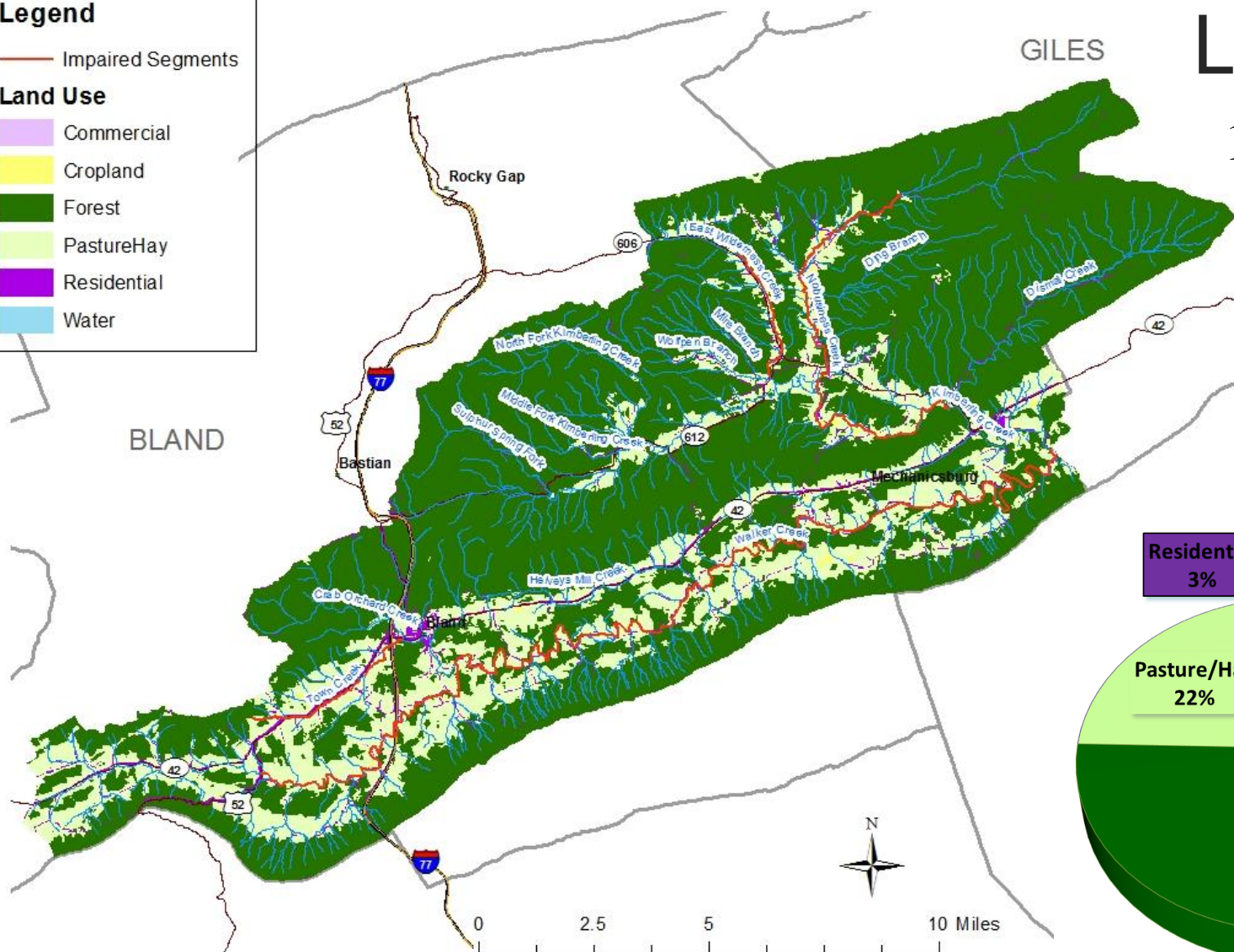
— Impaired Segments

Land Use

- Commercial
- Cropland
- Forest
- Pasture/Hay
- Residential
- Water

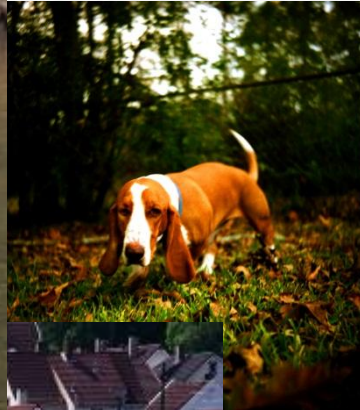
Land Use

115,104 acres



Causes of Impairment

- Any source of bacteria to the stream



Kyle Hall, 2006

How can you help?

- The slides to follow describe the sources of bacteria in the Walker Creek watershed
- Your input on all the populations presented will help us improve our watershed model

Sources and Distribution of Bacteria

Livestock

Wildlife

Crops

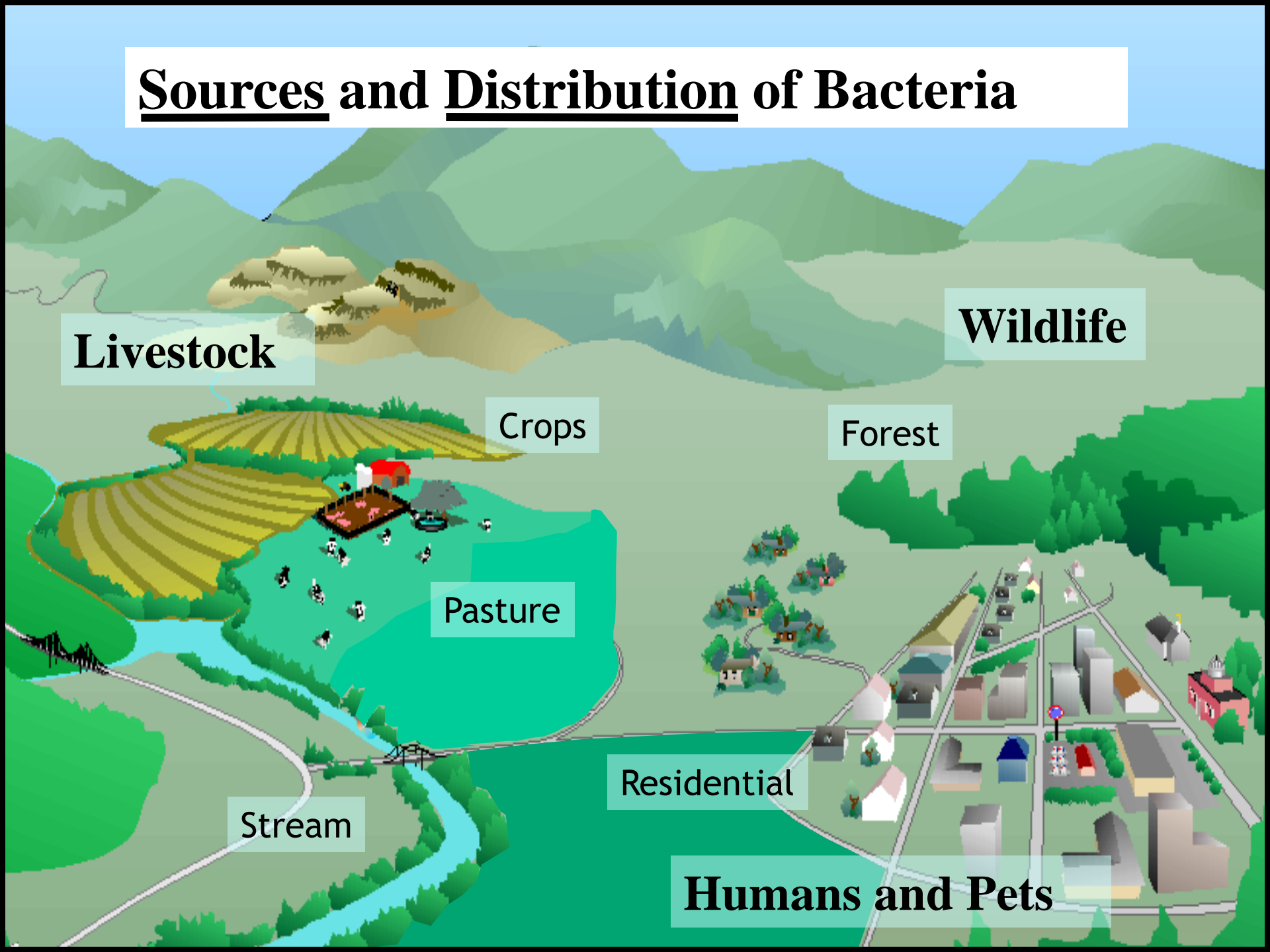
Forest

Pasture

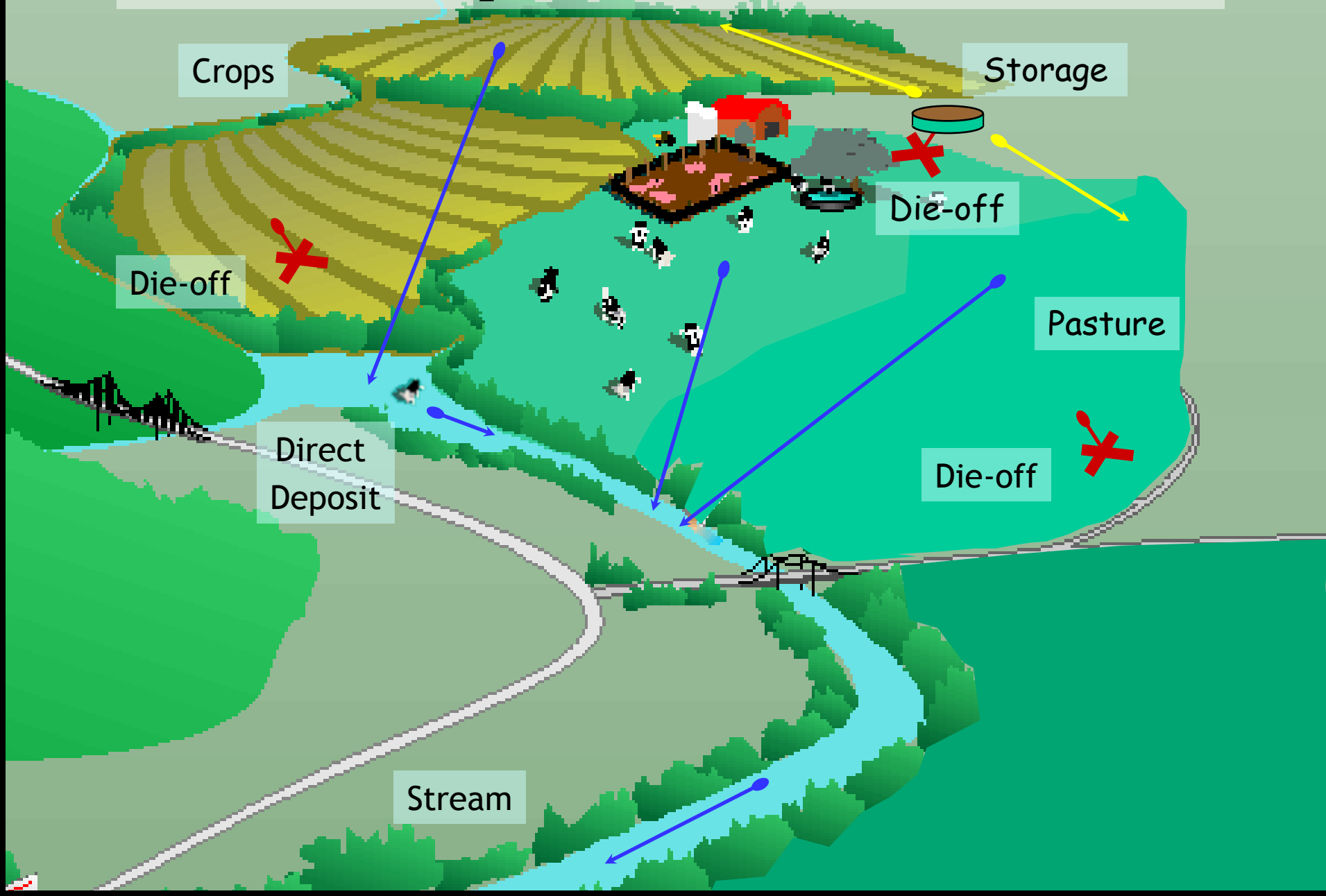
Stream

Residential

Humans and Pets



Fate and Transport of Bacteria: Livestock



Estimating Livestock Sources

- Beef and Dairy: we will work with personnel from Virginia Cooperative Extension and the Natural Resources Conservation Service, plus local stakeholders to obtain good watershed-specific estimates; we have also looked at the Census of Agriculture, VPA permits, and animals observed during a watershed tour
- Other livestock (pigs, horses, goats, sheep, poultry...): we can use information from the Census of Agriculture, VPA permits, and stakeholders

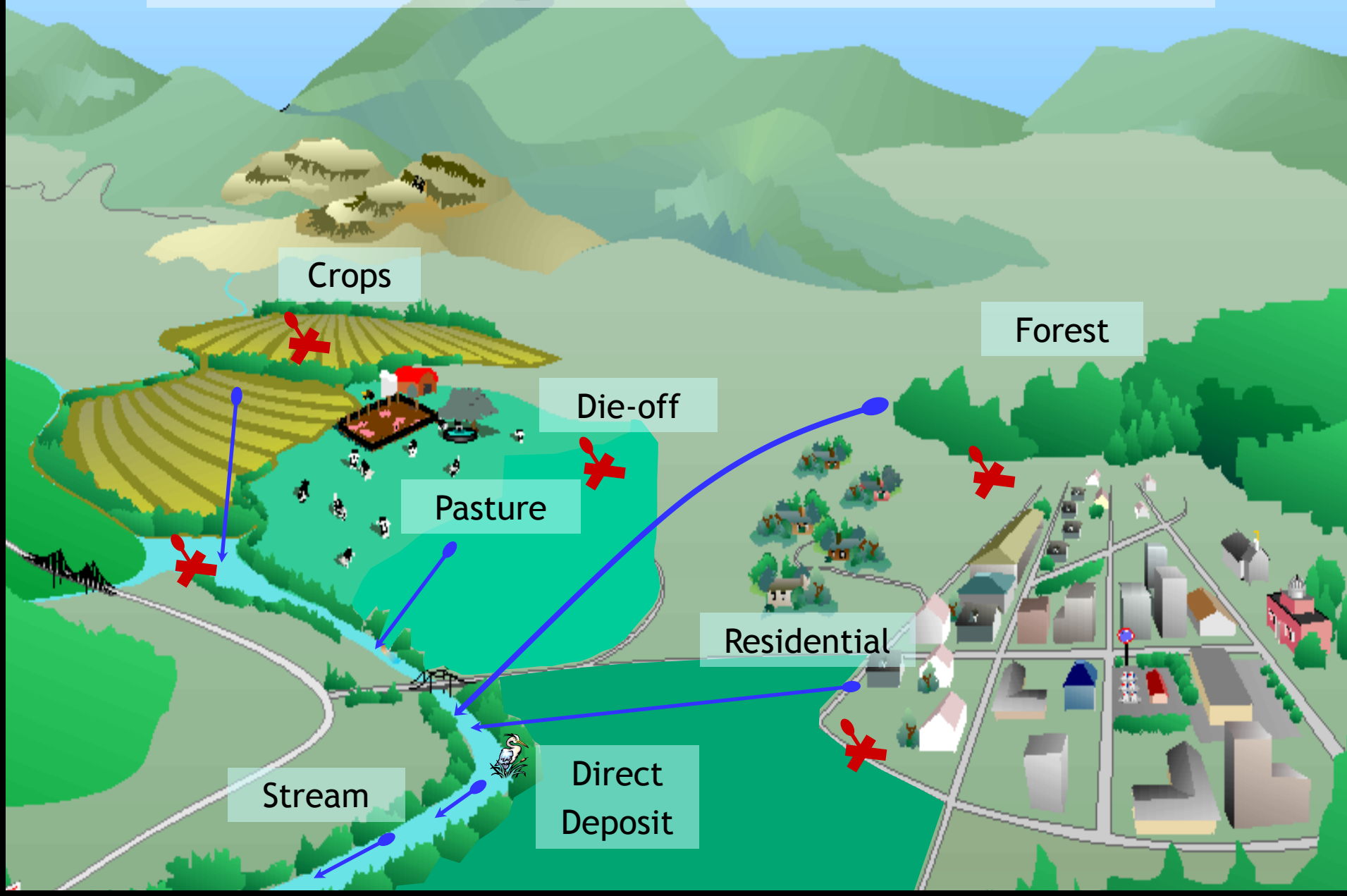
Initial Estimates of Livestock Population

Animal	Census of Agriculture Estimates
	Walker Creek
Beef	3,969 (<i>5 acres/animal unit</i>)
Dairy	one farm
Horses	184
Goats	138
Sheep	1,006
	Additional Estimates
Hogs	21
Poultry	532

Initial Estimates of Livestock Population

Sub-Watershed	Town Creek	Nobusiness Creek	East Wilderness Creek	Kimberling Creek	Walker Creek
Beef	278	243	106	678	2,664
Dairy		one farm			
Horses	13	13	5	32	121
Sheep	71	59	27	170	679
Goats	9	10	4	24	91
Poultry	37	34	14	91	356
Hogs	1	2	0	4	14

Fate and Transport of Bacteria: Wildlife



Estimating Wildlife Sources

- Land use
- Recommendations from Virginia Department of Game and Inland Fisheries, scientific literature, and previous TMDLs regarding wildlife habitat and population densities

Initial Estimates of Wildlife Population

Animal	Initial Estimates
	Walker Creek
Deer	4,141 (<i>28 animal units/acre</i>)
Raccoon	2,208
Muskrat	2,304
Beaver	412
Goose Low/High	461/645
Duck Low/High	411/617
Wild Turkey	972 (<i>89 animal units/acre</i>)

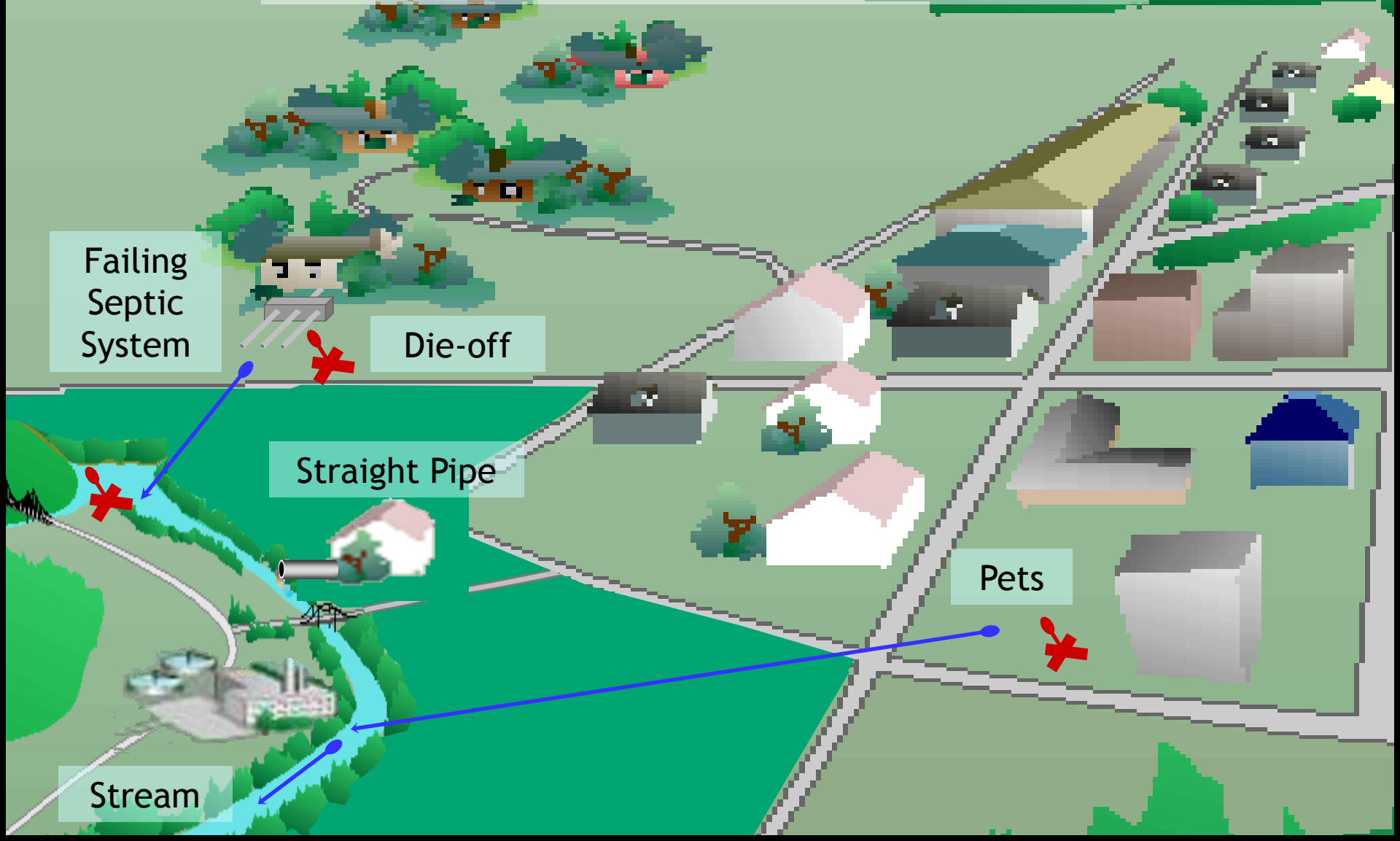
Initial Estimates of Wildlife Population

Sub-Watershed	Town Creek	Nobusiness Creek	East Wilderness Creek	Kimberling Creek	Walker Creek
Deer	121	575	152	1,483	1,810
Raccoon	60	340	90	891	827
Muskrat	46	61	27	635	1,535
Beaver	14	47	20	150	181
Geese*	13	56	21	171	200
Geese+	19	77	30	239	280
Duck*	12	50	18	152	179
Duck+	18	74	27	229	269
Wild Turkey	16	157	39	401	359

* Low

+ High

Fate and Transport of Bacteria: Humans and Pets



Estimating Residential Sources

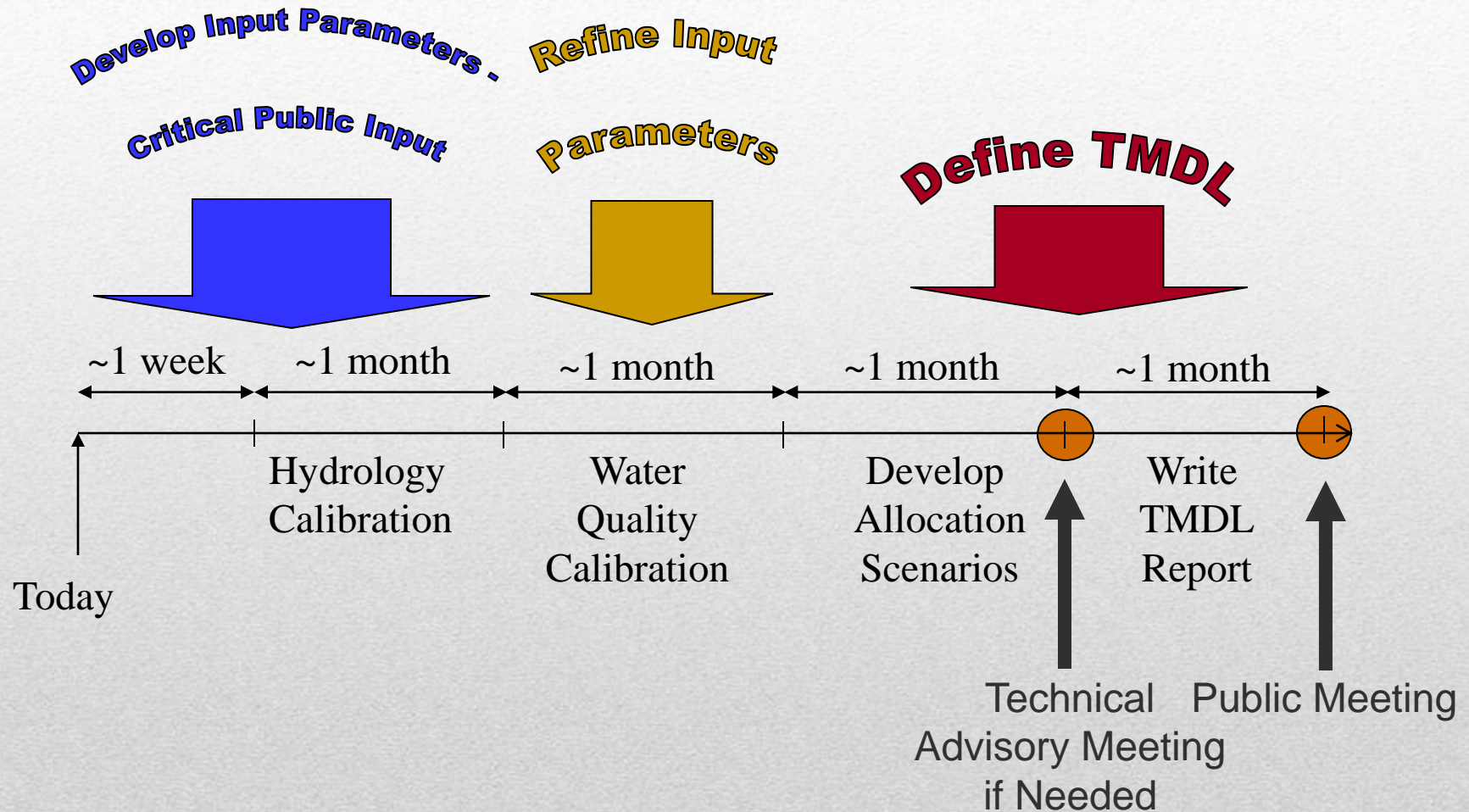
- Humans: population densities from the 2010 Census
- Houses: house locations from USGS 7.5-minute quadrangles and county structures data
- Failing septic systems, direct discharges, and sewer connections estimated from local expertise
- Pets: one pet per household

Initial Estimates of Human and Pet Populations

Sub-Watershed	Houses	People	Pets
Town Creek	125	332	125
Nobusiness Creek	114	237	114
East Wilderness Creek	76	157	76
Kimberling Creek	179	377	179
Walker Creek	724	2,075	724

These numbers are estimates based on the US Census

Next Steps



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